Increased Interoperability through Open System Architectures enabled by Ultra-Portable Servers and Personal Digital Assistants (PDAs)

National Defense Industrial Association
5th Annual Systems Engineering Conference
Tampa, Florida - October 24, 2002

Presenter: Allen E. Lusk III
Chief Engineer, Logistics Solutions
TRW, Inc. Reston, VA

TRW Systems & Information Technology

Allen E. Lusk III
Chief Engineer
Logistics

1895 Preston White Drive
RSVA/331
Reston, VA 20191-5434

Tel 703.648.3068
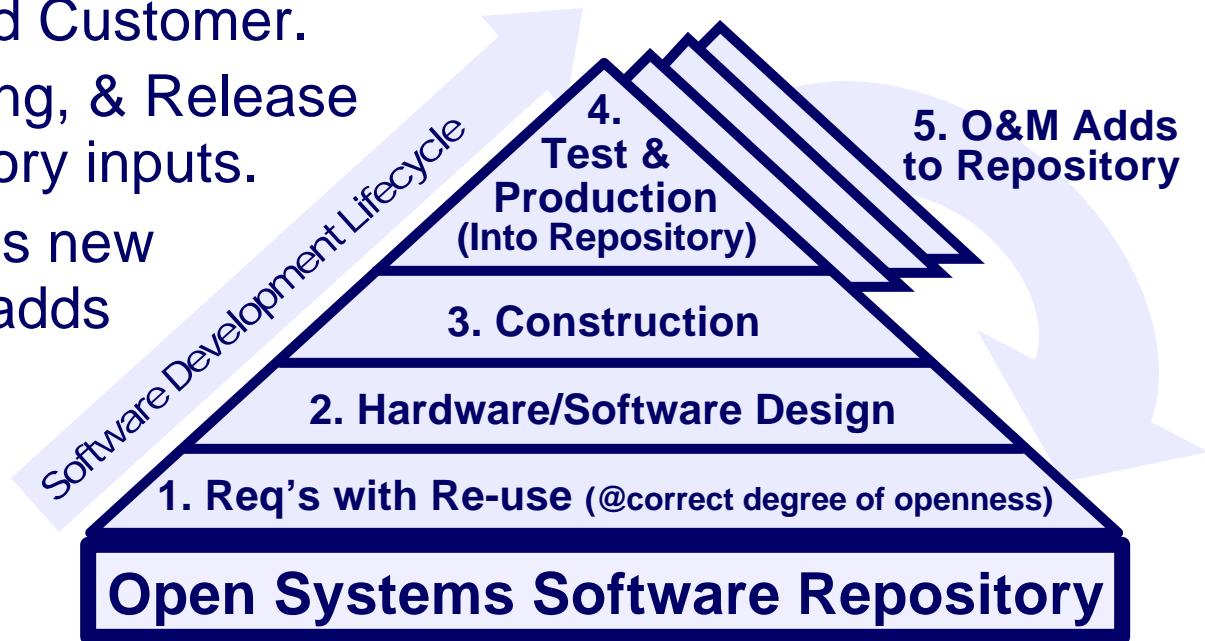*Fax 703.648.3080*
allen.lusk@trw.com

TRW

- TRW has developed an Open System-centric process that increases the interoperability of systems.
- Our Open Systems Methodology (OSM) Process:
  - Uses an integrated technical and functional strategy;
  - Uses widely-accepted hardware (HW) and software (SW);
  - Applies commercial, widely used interface standards; and
  - Minimizes the amount of custom hardware and software.
- Interoperability in this case means significantly improving Inter-Service and Intra-Service activities that are enabled by web-based solutions that use centralized databases.
- The scope of the enabling Information Technology (IT) has been centered around:
  - Readily available Personal Computer (PC) HW;
  - Inexpensive Industry Standard (SW) development database tools via the Microsoft (MS) product line.

What is "Ultra-Portable" ?

- We develop and maintain numerous software systems in the Government and Commercial arena, routinely reusing HW and SW architectures and modules.
- Homeland Security and other initiatives have spurred our development of "Ultra-Portable" solutions that feature:
  - Single laptop server with all web and database components;
  - Clients with either PC and browser, or more often;
  - PDA with periodic docking/beaming for data gathering.
- Using these small and lightweight components in the physical architecture yields:
  - Single person portable systems for rapid deployment;
  - Systems usable under basic field conditions;
  - More survivability and data security in fixed configurations;
  - Good data propagation to users & other systems via the web.

- Central repository of HW & SW architectures as well as a large body of routines with the IT scope mentioned earlier forms process core.
- Lifecycle always starts with Requirements; appropriate HW and SW architectures, routines, etc. re-used in varying degrees.
- System Design performed to exploit maximum re-use at the correct degree of openness; PDR and CDR accomplished here.
- Solution is constructed with process improvements (CMMI, 6σ, etc.) per Criticality and Customer.
- Sys Integration, Testing, & Release w/appropriate repository inputs.
- O&M Phase generates new versions and usually adds to repository content.
- The following example illustrates the process

**Software Development Lifecycle**

4. Test & Production (Into Repository)

5. O&M Adds to Repository

3. Construction

2. Hardware/Software Design

1. Req's with Re-use (@correct degree of openness)

Open Systems Software Repository

- 9/11 produced a number of hastily fielded websites that attempted to move information about victims to the public via the web.
- VADS, in development, provides a generalized solution that:
  - Is implemented rapidly at the disaster site to quickly provide timely and accurate data, propagated to the appropriate users on the Web;
  - Gathers field via PDA's (can also be directly input);
  - Requires little infrastructure – AC or 12VDC power initially, phone line or LAN enabled broadband needed downstream for the website;
  - Very simple IT skills for PDA data gatherers, enlisted on-site.
- Two sizes are envisioned.

Large System
Checkable @75#
4 Laptops, 12 PDA's
10/100 Switch
USB Scanner
5 Docking Stations

Small System
Carry-On @20#
1 Laptop, 6 PDA's
2 PDA Docking Sta
4 Charging Cables

IR/Dock
IR/Dock

30GB Laptop

Phone System

60GB Laptop

USB Scanner

IR/Dock
IR/Dock

10/100 Switch

10GB Laptops

- **Two components – Ultra-Portable Server & PDA's.**
- **Single VADS database in MS Access.**
- **Generated once by DBGen (VisualBasic Application).**
- **Website template is tailored by WebGen (VisualBasic Application).**
- **VADS PDA Application (AppForge VB Add-In) trains user and gathers data.**
- **Synchronized w/Data Injector (VB App).**
- **When enough data accumulates the site is tested on-site and published under a generic URL (no spidering).**
- **WebGen can generate anonymous, simple, or tracked login schemas.**
- **On-site personnel can provide their own PDA (currently Palm OS only) with the application beamed to allow them to gather data directly.**
- **Also investigating cameras, scanners, and GPS data gathering via the PDA devices.**
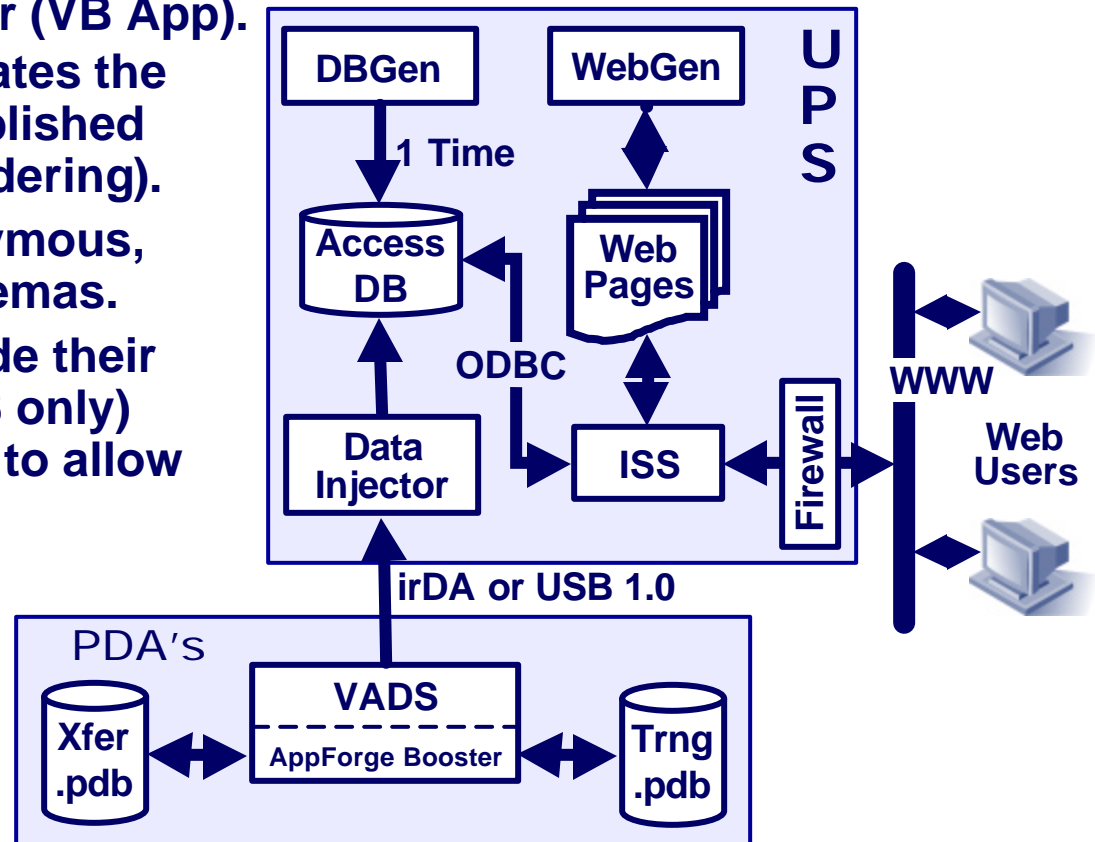
- **Our SW Repository yielded numerous modules, all based on widely-used Standards, that were (and are being) re-used in VADS**

- Production eBiz Site
  - Database Gen
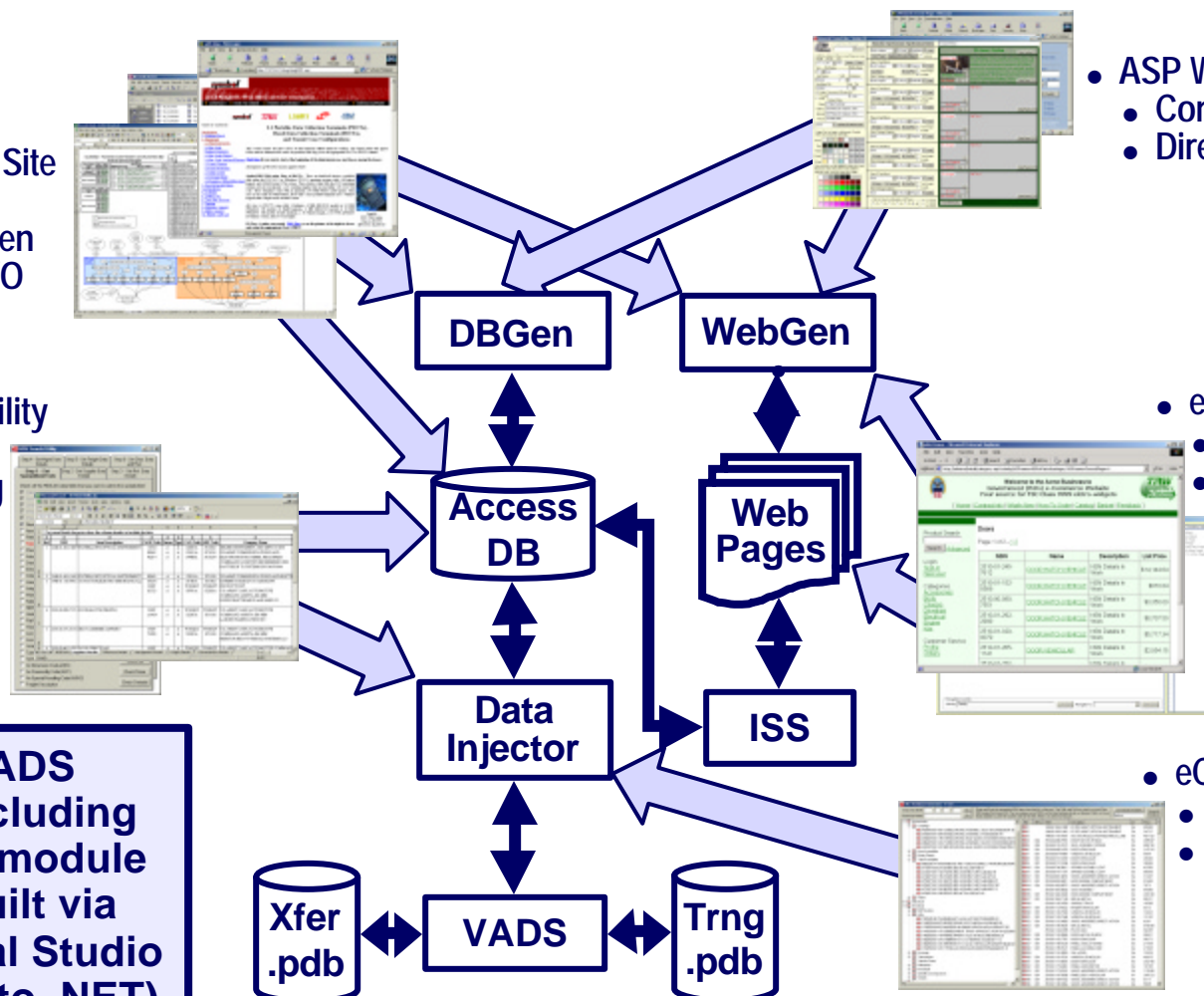 - Include File Gen
  - Direct Excel I/O

- FEDLOG NSN Utility
  - Database Gen
  - M2M encoding

- ASP Website
  - Complex RT Editing
  - Direct DB Gen

- eBiz Site Maintenance
  - Script Re-use
  - Direct Content Mgmt

- eCatalog for Downloads
  - M2M Encoding
  - Direct XML Gen

DBGen

WebGen

Access DB

Web Pages

Data Injector

ISS

Xfer .pdb

VADS

Trng .pdb

<u>All</u> the VADS Apps, including the PDA module in, are built via MS Visual Studio (moving to .NET)

Summary

NDIR
ONAL DEFENSE INDUSTRIAL ASSOCIA
Annual Systems Engineering Conference

TRW
Logistics Solutions

- Open Systems in Weapons System development generally yields better inter-operability.
- We have implemented the same notion in our Logistics Solutions that function as portable systems and are primarily web-based.
- We are using the MS toolset for SW development with PC's and PalmOS PDA's for HW - all widely accepted in the marketplace with public standards to assure an Open Systems solution.
- The key for us has been the establishment of a HW/SW repository tailored to Open Systems.
- Has yielded excellent re-use as new solutions are envisioned and fielded.